

- (e) Name a few automatic clutches. 2.5
 (f) What is power screws ? 2.5
 (g) Derive self-locking condition of brake. 2.5

UNIT - I

2. (a) Define "Interchangeability" and discuss its importance. 5
 (b) What do you understand by stress concentration ? Define and differentiate between from stress factor and stress concentration factor. 10
3. (a) Explain the factor to be considered for selection of material for a machine component. 7.5
 (b) Write the classification of Engineering Materials. 7.5

UNIT - II

4. Design a double riveted butt joint with two cover plates for the longitudinal steam of a boiler shell, 0.70 m diameter to carry a maximum steam pressure of 1.05 N/mm^2 . The allowable stress are $f_t = 35 \text{ N/mm}^2$, $f_s = 28 \text{ N/mm}^2$. Assume the efficiency of the joint 80%. 15
5. Two steel rods of equal diameter are required to join with a cotter joint. Each rod is subjected to an axial tensile force of 60 KN. Design and draw the joint specifying its main dimensions. 15

3313- (P-4)(Q-9)(23) (2)

UNIT - III

6. Design a clamp coupling to transmit 30 kW at 100 rpm. The allowable shear stress for the shaft and key is 40 MPa and the for bolts is 70 MPa. The coefficient of friction between muff and the shaft surface may be taken as 0.3. 15
7. Design and draw a cast iron flange coupling for a mild steel shaft transmitting 90kW at 250 rpm. The allowable shear stress in the shaft is 40 MPa and the angle of twist is not to exceed 1 degree in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 MPa. 15

UNIT - IV

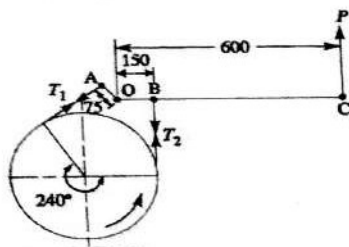
8. (a) Why a positive clutch is used ? Describe, with the help of a neat sketch, the working of a jaw or claw clutch. 5
 (b) A multi-disc clutch has three discs on the driving shaft and two on the driven shaft. The inside diameter of the contact surface is 120 mm. The maximum pressure between the surface is limited to 0.1 N/mm^2 . Design the clutch for transmitting 25 kW at 1575 r.p.m. Assume uniform wear condition and coefficient of friction as 0.3. 10

3313- (P-4)(Q-9)(23) (3)

P. T. O.

..... has a drum diameter of 600 mm and the angle of contact is 240° . The brake band is 5 mm thick and 100 mm wide. The coefficient of friction between the band and the drum is 0.3. If the band is subjected to a stress of 50 MPa, find :

- 15
- The least force required at the end of a 600 mm lever, and
 - The torque applied to the brake drum shaft.



All dimensions in mm.

Roll No.

3313

**B. Tech. 6th Semester (ME)
Examination – May, 2023**

DESIGN OF MACHINE ELEMENT - I

Paper : PCC-ME-304-G

Time : Three Hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

Use of following Design Data book is permitted :
(i) Design Data Handbook (In SI and Metric Units) for Mechanical Engineers by Mahadevan (ii) Design Data Book PSG College of Technology Coimbatore.

1. Answer any 6 out of 7 :

- | | |
|--|-----|
| (a) What is technical feasibility ? Explain. | 2.5 |
| (b) What is the belt slip and creep ? | 2.5 |
| (c) Describe the function of key. | 2.5 |
| (d) Write the application of chain drives. | 2.5 |